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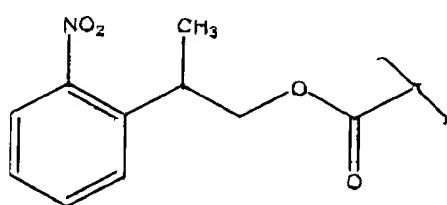
B is an aprotic, weakly basic group; and
R and **R**₁ are each, independently, -H, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl group, an optionally substituted aryl group, or an optionally substituted heteroaromatic group.

REMARKS

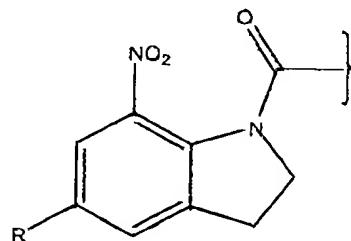
Claim Amendments

Applicants previously filed an Amendment After Final on August 13, 2002 and a Second Amendment After Final on October 17, 2002. In the Advisory Action mailed from the U.S. Patent and Trademark Office on September 20, 2002, the Examiner denied entry of the Amendment After Final. In the Advisory Action mailed from the U.S. Patent and Trademark Office on November 14, 2002, the Examiner denied entry of the Second Amendment After Final. Thus, prior to this amendment, the claims stand as amended on November 21, 2001, and the marked-up claims reflect changes relative to the claims as of November 21, 2001.

Claims 1, 5 and 14 have been amended to remove photolabile groups having the following structural formulas from the list of structures from which Y or Y₁ is selected:



and



Claims 1, 5 and 14 have also been amended to remove the 1-carbonyloxy-3-nitrobenzene structure and to recite that n is 1 to about 3, instead of 0 to about 3.

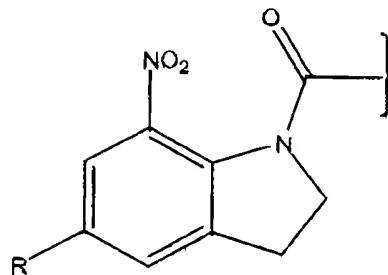
Claims 30, 32 and 34 have been amended to remove photolabile protecting groups having the following structural formula from the list of structures from which Y₁ is selected:

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Claim 7 has been amended to recite "additional molecule" rather than "second molecule." Claim 7 has been further amended to indicate that Y_1 of the additional molecule is selected from the group of photolabile protecting groups listed in Claim 5 and is the same as or different from Y_1 of the first molecule. In addition, Claim 7 has been amended to indicate that M_1 of the additional molecule is a monomeric building block and is the same as or different from M_1 of the first molecule. Support for this amendment can be found, for example, on page 9, lines 23-26 of the specification.

Claim 8, which depends on Claim 7, has been amended to indicate that steps (a) and (b) are repeated. Support for this amendment can be found, for example, on page 9, lines 23-26 of the specification.

Claim 14 has been amended to recite that M_1 and Y_1 in steps (b), (c) and (e) are the same as or different from each other. Support for the amendment can be found, for example, at page 10, line 21 through page 11, line 2 of the specification.

Claim 30 has been amended to indicate that M in the formula $M-Y_1$ is a monomeric building block, a solid surface or a gel having a reactive site masked by Y_1 . Support for this amendment can be found, for example, on page 6, line 27 to page 7, line 4 and page 9, lines 1-6 of the specification.

Claims 32 and 34 have been rewritten as independent claims, incorporating all the recitations of Claims 5, 7 and 8 and Claim 14, as amended, respectively.

New Claim 36-38 have been added. M and M_1 in Claims 36-38 have been defined to be selected from the group consisting of nucleic acids, nucleosides and analogs thereof, nucleotides and analogs thereof, and monosaccharides. Support for the recitation can be found at page 6, line 27 through page 7, line 23 of the specification.

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Advisory Action and Telephonic Interview

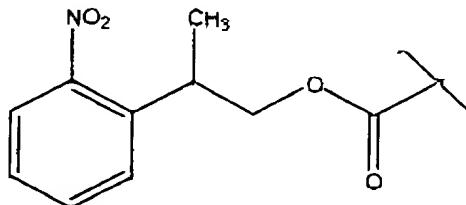
Applicant's Attorney thanks the Examiner for the opportunity to clarify the nature of the first Amendment After Final in a telephonic interview on October 11, 2002; specifically, Applicant's Attorney clarified that the amendments to Claims 14, 30 and 34 would not necessitate a new search.

Applicant notes that Claims 30, 32 and 34, as amended herein, do not recite a definition of "R", obviating any issues raised under 35 U.S.C. § 112, second paragraph, in the Advisory Action.

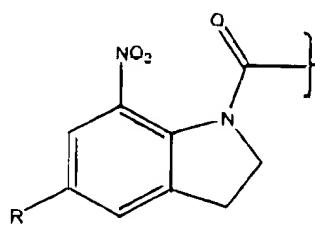
Rejection of Claims 1-4 Under 35 U.S.C. 102(b)

Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Pfleiderer, *et al.* (References B and N). Claims 1-4 are rejected under 35 U.S.C. § 102(b) as being anticipated by Pfleiderer, *et al.*, WO 96/18637 A2 (Reference N) or Pfleiderer, *et al.*, U.S. Patent No. 5,763,599 (Reference B; hereinafter the two references are referred to jointly as "Pfleiderer").

In the Office Action mailed March 13, 2002, the Examiner states that Pfleiderer discloses thymidine, 5'-[2-(2-nitrophenyl)propyl carbonate], which the Examiner believes corresponds to M-Y₁ as claimed in Claims 1-4, where M is a nucleoside and Y₁ has the formula:



Applicant has amended Claim 1 to remove the Y₁ photolabile protecting group having the following structural formula:



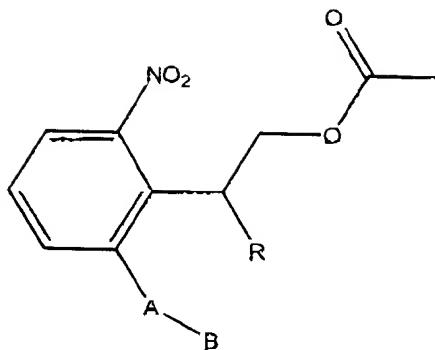
In the Advisory Action, the Examiner states that a compound represented by the following structural formula reads on the "Y" photolabile protecting group of Claim 1:

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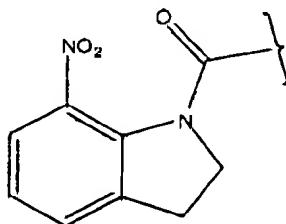


when n is 0, B is NO_2 , and R is H.

Applicant has amended Claims 1, 5 and 14 to recite that n is from 1 to about 3. Applicant notes that $(\text{CH}_2)_0$ constitutes a covalent bond, which is distinguished from a series of 1 to 3 methylene groups. In amending the claim, Applicant has eliminated the Markush group member where A is a covalent bond, but have not modified the range of methylene units encompassed by A. Thus, the instant claims do not read on the photolabile protecting groups of Pfleiderer, *et al.* The variables "-A-B" in the above structure and "R₃" of formula (I) in Pfleiderer, *et al.*, are each ortho to an ethoxycarbonyl group and meta to a nitro group on the phenyl ring. R₃ is defined by Pfleiderer, *et al.*, as being H, F, Cl, Br or NO_2 . A has been amended to be O, S, N-alkyl, N-aryl or 1 to 3 methylene groups. None of the R₃ groups are encompassed by A or A-B. Therefore, Pfleiderer, *et al.*, do not anticipate the claimed subject matter. Reconsideration and withdrawal of the rejection are requested.

Rejection of Claims 1-2 Under 35 U.S.C. § 102(b)

Claims 1-2 are rejected under 35 U.S.C. § 102(b) as being anticipated by Papageorgiou, *et al.*, *J. Am. Chem. Soc.* (1999), 121:6503-6504 (Reference U; hereinafter "Papageorgiou"). In the Office Action mailed March 13, 2002, the Examiner states that Papageorgiou discloses a glutamate residue modified with a group having the following formula:



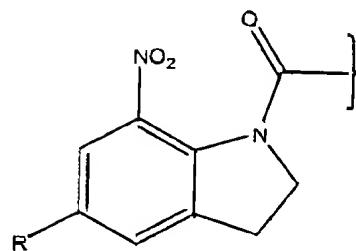
in which the benzyl ring is modified with an alkyl substituent in the meta position with respect to the nitro group.

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Applicant has amended Claim 1 to remove the Y₁ photolabile protecting group having the following structural formula:



Thus, Claims 1-2, as amended, are not anticipated by Papageorgiou. Therefore, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

Rejection of Claims 1-23 Under 35 U.S.C. § 103(a)

Claims 1-23 are rejected under 35 U.S.C. § 103(a) as being obvious over Pfleiderer, *et al.*, in view of Fodor, *et al.* (Reference C1), or McGall, *et al.* (Reference A). In the Advisory Action, the Examiner states that a *prima facie* case of obviousness may be made when chemical compounds have very close structural similarities and similar utilities, and the Examiner continues that an obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound.

The compounds recited in instant Claims 1-23, as amended herein, do not encompass any of the compounds taught by Pfleiderer, *et al.* Accordingly, combination of Pfleiderer, *et al.*, with Fodor, *et al.*, or McGall, *et al.*, does not teach or suggest the compositions or methods of the invention as currently claimed. Reconsideration and withdrawal of the rejection are respectfully requested.

Furthermore, Applicant respectfully disagrees that one skilled in the art would be motivated to prepare a nitrophenyl group with S, O, N-alkyl, N-aryl, or one to three methylene groups meta to the nitro group based on the teachings of Pfleiderer, *et al.* Pfleiderer, *et al.*, teach only H, F, Cl, Br and NO₂ groups ortho to the nitro group. Pfleiderer, *et al.*, do not teach or suggest other substituent groups at "R₃", and also state that undesirable by-products in the form of toxic nitrosophenyl compounds are obtained to some extent during the cleavage of o-nitrobenzyl compounds (column 1, lines 30-32 of U.S. Patent No. 5,763,599). The reference therefore teaches away from modification of R₃ beyond the specific substituent groups taught by Pfleiderer, *et al.* Moreover, one skilled in the art would expect that a nitrophenyl photolabile protecting group outside the teachings of Pfleiderer, *et al.*, may have undesirable cleavage products.

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While McGall, *et al.*, teach a number of nitrophenyl photolabile protecting groups, none of the exemplified protecting groups contain a substituent meta to the nitro group and ortho to the carbonyloxyalkyl group (e.g., where -A-B is located). Fodor, *et al.*, only appear to teach the NVOC protecting group, which also has no substituent meta to the nitro group and ortho to the carbonyloxyalkyl group. Thus, the teachings of McGall, *et al.* and Fodor, *et al.*, do not remedy the deficiencies of Pfleiderer, *et al.*, and one skilled in the art would not be motivated to prepare a protecting group represented by the above structure having S, O, N-alkyl, N-aryl or one to three methylene groups ortho to the carbonyloxyethyl group and meta to the nitro group on the phenyl ring. As a result, the instant compounds and methods are not obvious in view of the cited references. Reconsideration and withdrawal of the rejection are requested.

Rejection of Claims 7-12 and 30-35 Under 35 U.S.C. § 112, Second Paragraph

In the Office Action mailed March 13, 2002, Claims 7-12 and 30-35 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The Examiner states that Claim 7, and the claims depending therefrom, are vague and indefinite because the metes and bounds of the phrase "wherein Y₁ and M₁ of the second molecule are selected independent of the first molecule" are vague and indefinite.

Applicant has amended Claim 7 to recite that Y₁ of the additional molecule is selected from the group of photolabile protecting groups listed in Claim 5 and that Y₁ of the additional molecule is the same as or different from Y₁ of the first molecule. In addition, Claim 7 has been amended to indicate that M₁ of the additional molecule is a monomeric building block and is the same as or different from M₁ of the first molecule. Thus, Claim 7, as amended, more distinctly sets forth the metes and bounds of the claimed subject matter.

The Examiner states that Claim 8, and the claims depending therefrom, are vague and indefinite because the metes and bounds of the phrase "molecules represented by the formula M₁-Y₁, wherein Y₁ and M₁ for each occurrence are selected independently" are vague and indefinite.

Claim 8 has been amended to eliminate the above phrase and recite that the method comprises repeating steps (a) and (b). Thus, Claim 8, as amended, more distinctly sets forth the metes and bounds of the claimed subject matter.

The Examiner states that Claim 30 is vague and indefinite because the formula M-Y₁ is recited in the claim, but the term "M" is not defined. In addition, the Examiner states that one of the compounds that correspond to Y₁ comprise the term "R", but there is no definition for R in the claim.

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Claim 30 has been amended to recite that M in the formula M-Y₁ is a monomeric building block, a solid surface or a gel having a reactive site masked by Y₁. The only structure having an "R" substituent group has been removed from the claim, such that a definition of R is no longer required. Thus, Claim 30, as amended, more distinctly sets forth the metes and bounds of the claimed subject matter.

The Examiner states that Claims 32-33 recite various compounds which correspond to Y₁; however, the Examiner believes that the Y₁ compounds recited in Claim 32 lack antecedent basis.

Claim 32 has been rewritten as an independent claim, incorporating all of the limitations of Claims 5, 7 and 8, as amended, thereby obviating the rejection.

The Examiner states that Claims 34-35 recite various compounds that correspond to Y₁; however, the Examiner believes that the Y₁ compounds recited in Claim 34 lack antecedent basis.

Claim 34 has been rewritten as an independent claim, incorporating all of the limitations of Claim 14, as amended, thereby obviating the rejection.

In view of the above amendments and remarks, Applicant believes that Claims 7-12 and 30-35 meet the requirements of 35 U.S.C. § 112, second paragraph, and Applicant respectfully requests that the rejection be reconsidered and withdrawn.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned at (978) 341-0036.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

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Concord, MA 01742-9133

Dated: 11/18/02

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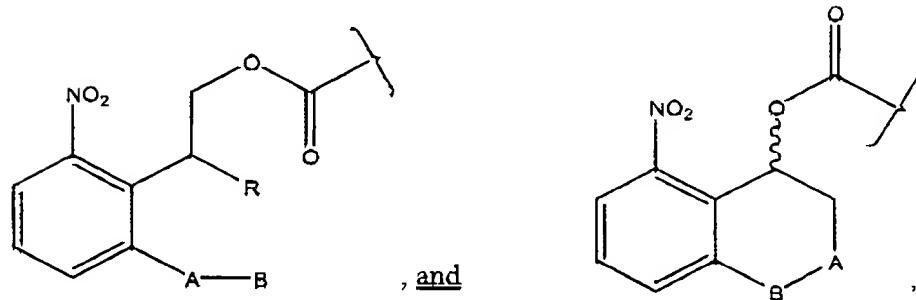
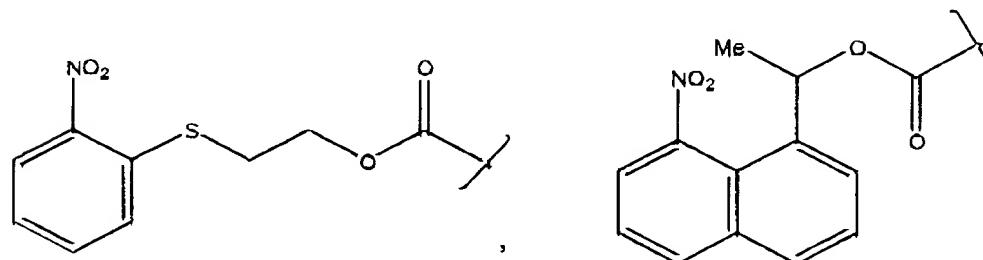
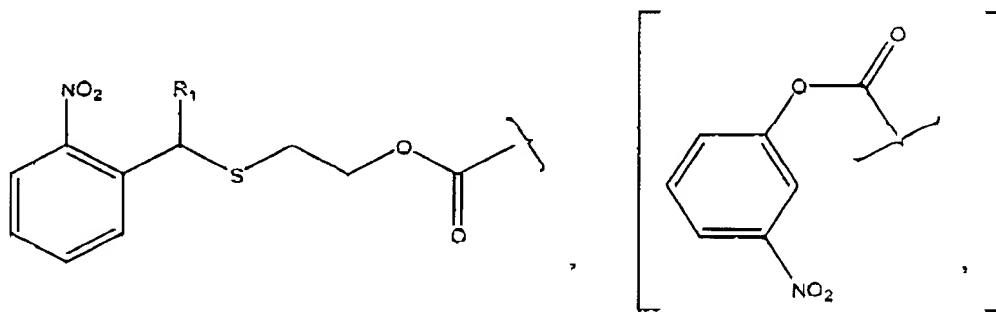
MARKED UP VERSION OF AMENDMENTS

Claim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

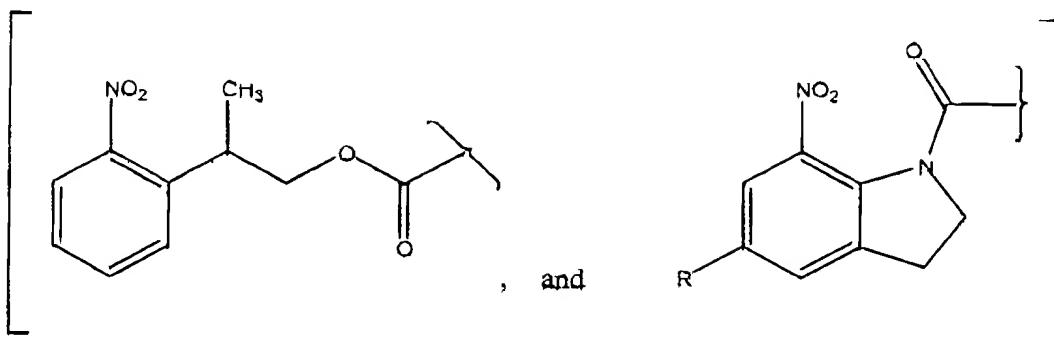
1. (Twice Amended) A compound represented by the formula M-Y, wherein:

M is a monomeric building block, a solid surface or a gel having a reactive site that is masked by Y; and

Y is a photolabile protecting group selected from the group consisting of:



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wherein:

the aromatic ring is optionally substituted with an alkoxy group or a methylenedioxy group;

A is O, S, N-alky, N-aryl[,] or $(CH_2)_n$;

n is [0] 1 to about 3;

B is an aprotic, weakly basic group; and

R and R_1 are each, independently, -H, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl [alkynyl] group, an optionally substituted aryl group, or an optionally substituted heteroaromatic group.

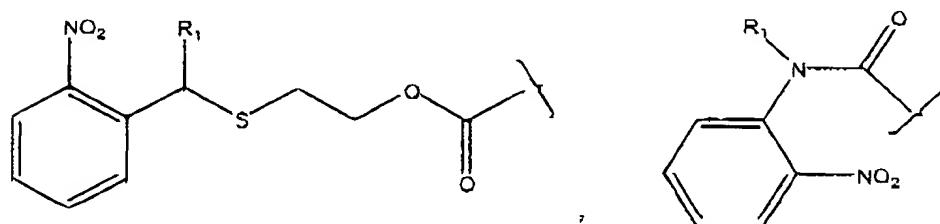
5. (Twice Amended) A method of attaching a molecule with a reactive site to a support comprising the steps of:

(a) providing a support with a reactive site;

(b) binding a first molecule represented by the formula M_1-Y_1 to the reactive site, wherein:

M_1 is a monomeric building block having a reactive site that is masked by Y_1 ;
and

Y_1 is a photolabile protecting group selected from the group consisting of:

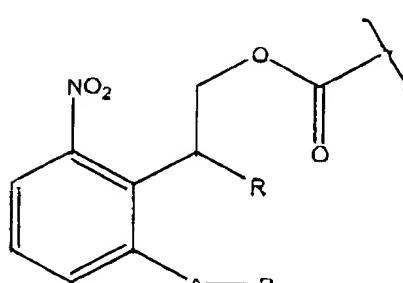
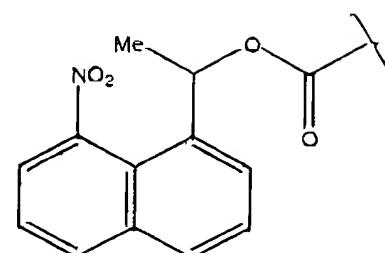
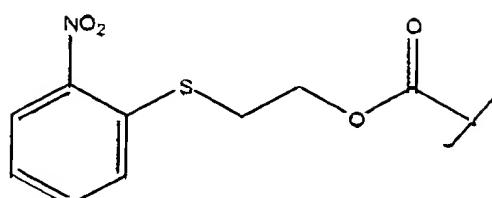
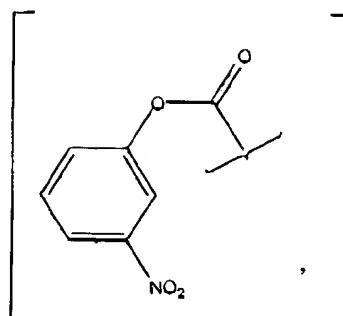
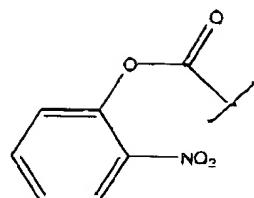


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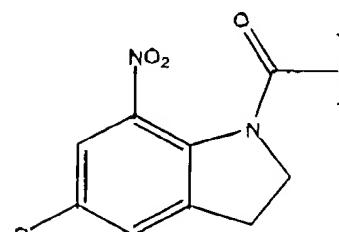
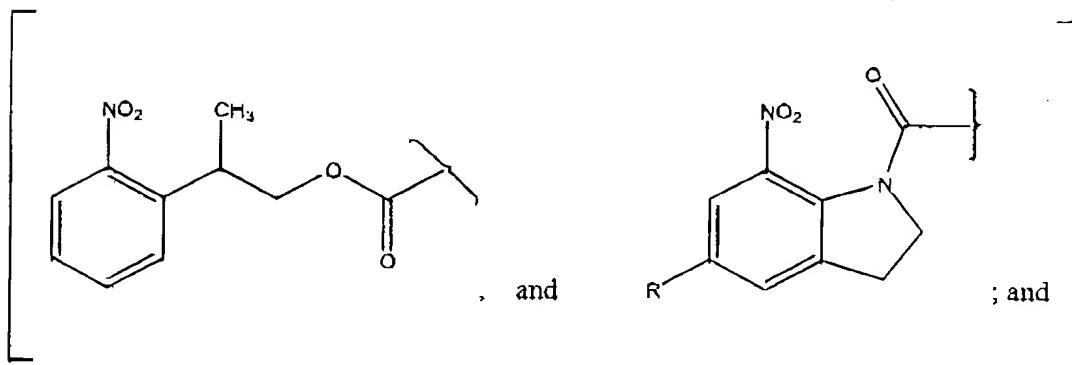
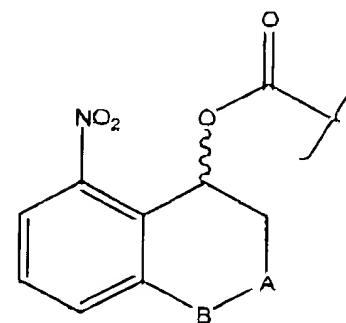
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, and



wherein:

the aromatic ring is optionally substituted with an alkoxy group or a methylenedioxy group;

A is O , S , N -alkyl, N -aryl[,] or $(CH_2)_n$;

n is $[0]$ 1 to about 3;

B is an aprotic, weakly basic group; and

R and R_1 are each, independently, $-H$, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl [alkynyl] group, an optionally substituted aryl group, or an optionally substituted heteroaromatic group; and

(c) removing Y_1 to provide a derivatized support comprising M_1 with an unmasked reactive site immobilized thereon.

7. (Twice Amended) The method of Claim 5, further comprising:

(a) coupling an additional [a second] molecule represented by the formula M_1-Y_1 to the unmasked reactive site, wherein Y_1 of the additional molecule is selected from the group of photolabile protecting groups listed in Claim 5 and is the same as or different from Y_1 of the first molecule, and M_1 of the additional molecule is a monomeric building block and is the same as or different from M_1 of the first molecule [second molecule are selected independent of the first molecule], to produce a derivatized support having immobilized thereon a chain of the first and the additional [second] molecules; and

(b) removing Y_1 from the additional [second] molecule to provide a derivatized support with a chain of the first and the additional [second] molecules with an [a second] unmasked reactive site immobilized thereon.

8. (Twice Amended) The method of Claim 7, further comprising repeating steps (a) and (b) [of Claim 7 with a succession of molecules represented by the formula M_1-Y_1 , wherein M_1 for each occurrence are selected independently] to provide a chain of molecules immobilized on the support.

14. (Twice Amended) A method of forming, from component molecules represented by the formula M_1-Y_1 , a plurality of compounds bound to a support, each compound occupying a separate predefined region of the support, said method comprising the steps of:

(a) activating a first region of the support;
(b) binding a molecule represented by the formula M_1-Y_1 to the first region;

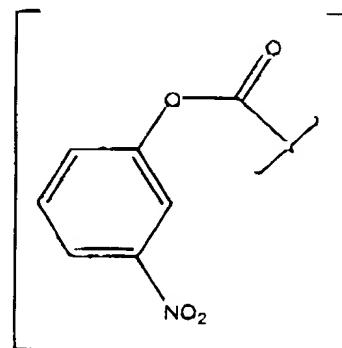
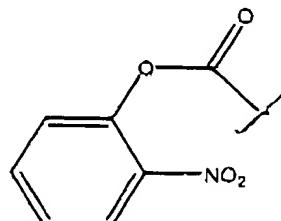
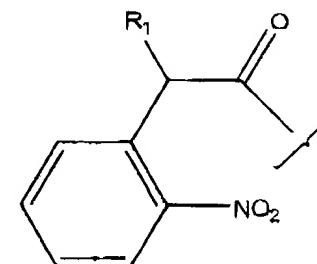
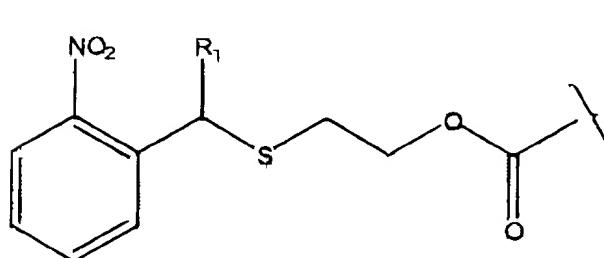
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- (c) repeating steps (a) and (b) on other regions of the support whereby each of said other regions has bound thereto another molecule represented by the formula M_1-Y_1 , wherein M_1 is the same as or different from M_1 of step (b) and Y_1 is the same as or different from Y_1 of step (b);
- (d) removing Y_1 from the M_1 that is bound to one or more regions of the support to provide one or more regions having an unmasked reactive site;
- (e) binding an additional molecule represented by the formula M_1-Y_1 to the said one or more unmasked reactive sites, wherein M_1 is the same as or different from M_1 of steps (b) and (c) and Y_1 is the same as or different from Y_1 of steps (b) and (c); and
- (f) repeating steps (d) and (e) on regions of the support until a desired plurality of compounds is formed from the component molecules represented by formula M_1-Y_1 , each compound occupying separate predefined regions of the support;

wherein:

M_1 [for each occurrence] is a [an independently selected] monomeric building block having a reactive site that is masked by Y_1 ; and

Y_1 [for each occurrence] is a photolabile protecting group [that is independently] selected from the group consisting of:

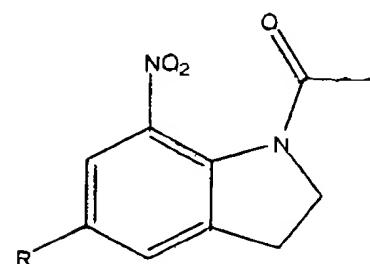
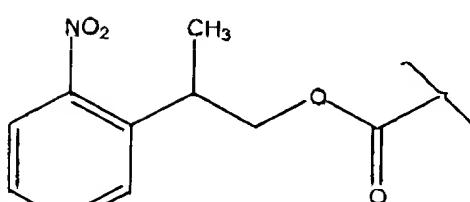
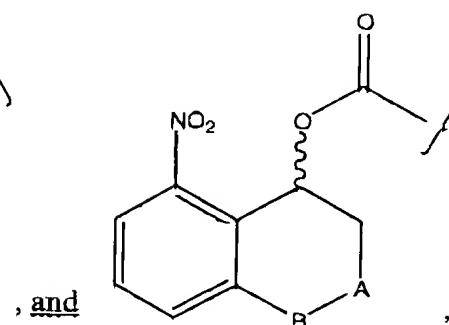
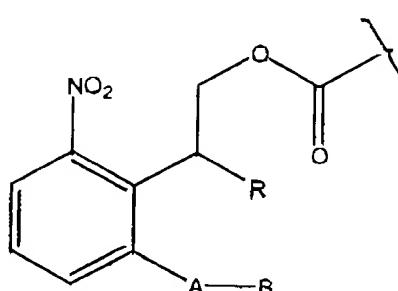
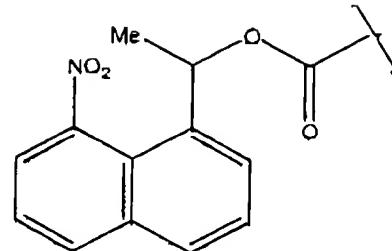
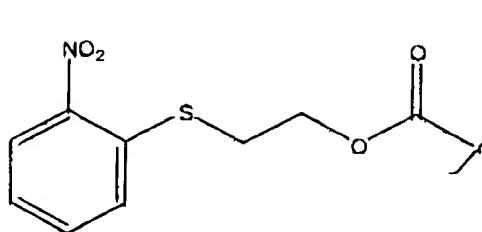


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wherein:

the aromatic ring is optionally substituted with an alkoxy group or a methylenedioxy group;

A is O, S, N-alkyl, N-aryl[,] or $(CH_2)_n$;

n is [0] 1 to about 3;

B is an aprotic, weakly basic group; and

R and **R**, are each, independently, -H, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl group, an

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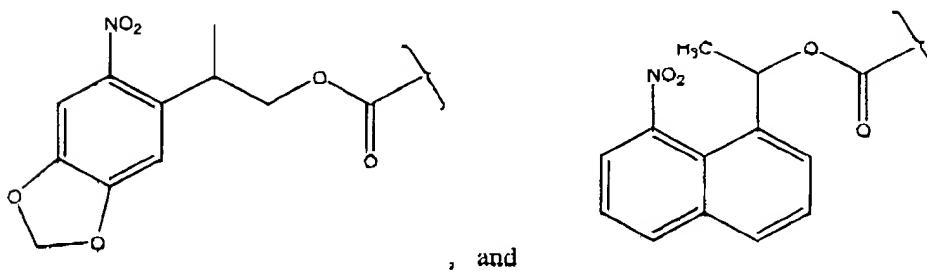
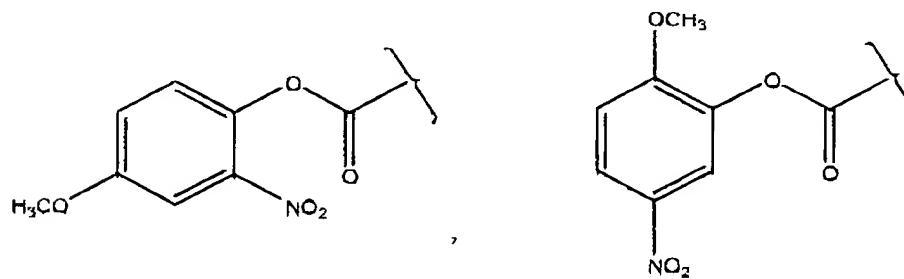
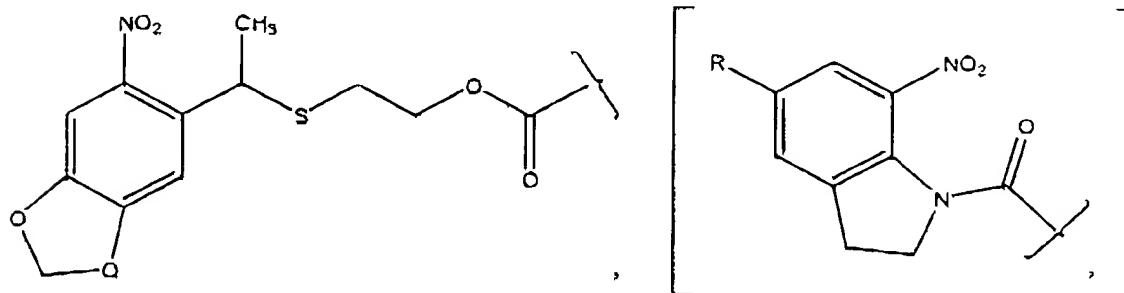
optionally substituted aryl group, or an optionally substituted heteroaromatic group[; and

(f) repeating steps (d) and (e) on regions of the support until a desired plurality of compounds is formed from the component molecules represented by formula M₁-Y₁, each compound occupying separate predefined regions of the support].

30. (Amended) A compound represented by the formula M-Y₁, wherein:

M is a monomeric building block, a solid surface or a gel having a reactive site that is masked by Y₁; and

Y₁ is selected from [form] the group consisting of:



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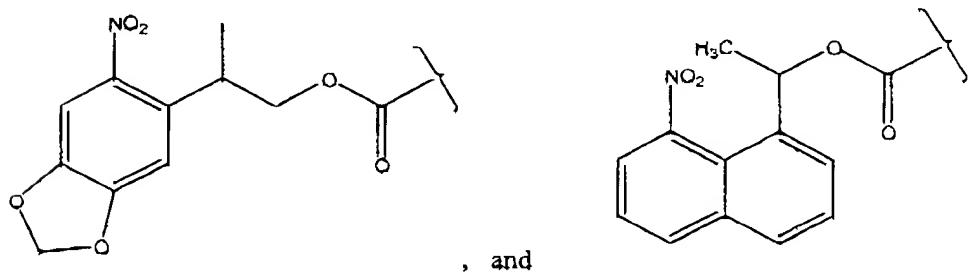
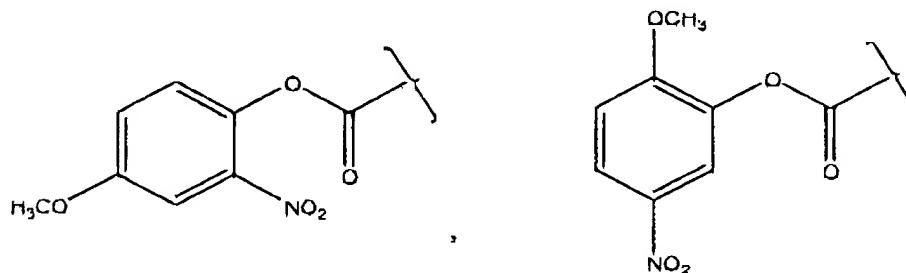
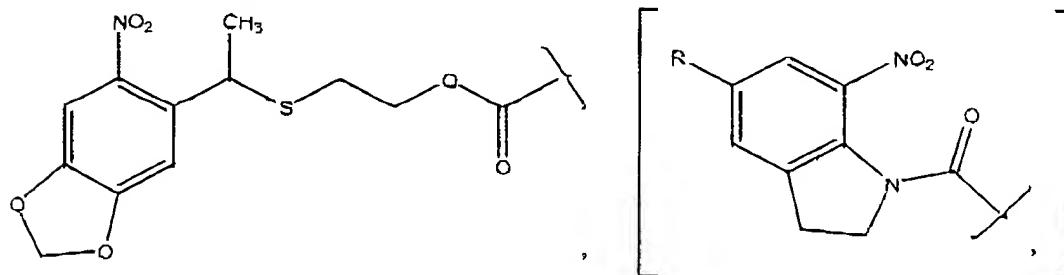
32. (Amended) [The method of Claim 8, wherein] A method of attaching a molecule with a reactive site to a support comprising the steps of:

(a) providing a support with a reactive site;

(b) binding a first molecule represented by the formula M_1-Y_1 to the reactive site,
wherein:

M_1 is a monomeric building block having a reactive site that is masked by Y_1 ;
and

Y_1 [for each occurrence is, independently,] is a photolabile protecting group
selected from the group consisting of:



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- (c) removing Y_1 to provide a derivatized support comprising M_1 with an unmasked reactive site immobilized thereon;
- (d) coupling an additional molecule represented by the formula M_1-Y_1 to the unmasked reactive site, wherein Y_1 of the additional molecule is selected from the group of photolabile protecting groups listed in step (b) and is the same as or different from Y_1 of the first molecule, and M_1 of the additional molecule is a monomeric building block and is the same as or different from M_1 of the first molecule, to produce a derivatized support having immobilized thereon a chain of the first and the additional molecules;
- (e) removing Y_1 from the additional molecule to provide a derivatized support with a chain of the first and the additional molecules with an unmasked reactive site immobilized thereon; and
- (f) repeating steps (d) and (e), to provide a chain of molecules immobilized on the support.

34. (Amended) [The method of Claim 14, wherein] A method of forming, from component molecules represented by the formula M_1-Y_1 , a plurality of compounds bound to a support, each compound occupying a separate predefined region of the support, said method comprising the steps of:

- (a) activating a first region of the support;
- (b) binding a molecule represented by the formula M_1-Y_1 to the first region;
- (c) repeating steps (a) and (b) on other regions of the support whereby each of said other regions has bound thereto a molecule represented by the formula M_1-Y_1 , wherein M_1 is the same as or different from M_1 of step (b) and Y_1 is the same as or different from Y_1 of step (b);
- (d) removing Y_1 from the M_1 that is bound to one or more regions of the support to provide one or more regions having an unmasked reactive site;
- (e) binding an additional molecule represented by the formula M_1-Y_1 to the said one or more unmasked reactive sites, wherein M_1 is the same as or different from M_1 of steps (b) and (c) and Y_1 is the same as or different from Y_1 of steps (b) and (c); and

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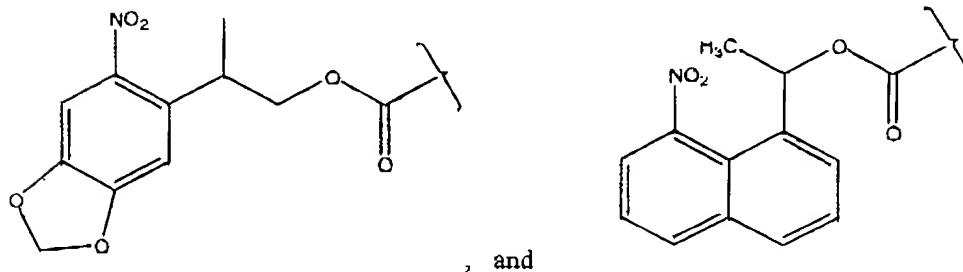
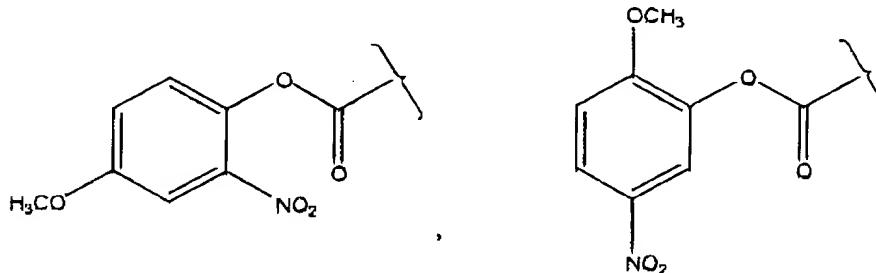
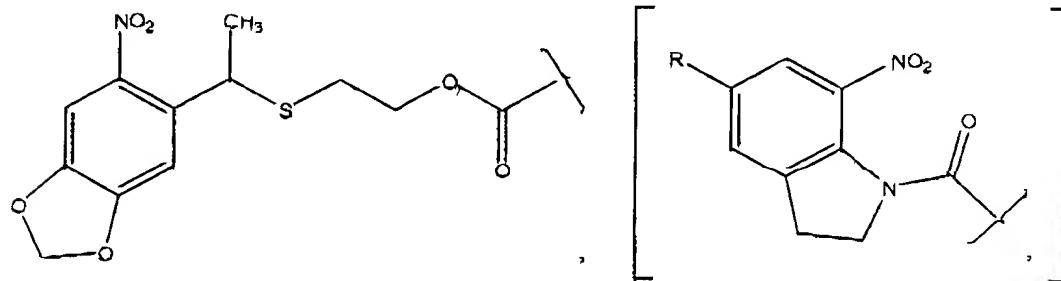
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(f) repeating steps (d) and (e) on regions of the support until a desired plurality of compounds is formed from the component molecules represented by formula M₁-Y₁, each compound occupying separate predefined regions of the support;

wherein:

M₁ is a monomeric building block having a reactive site that is masked by Y₁; and Y₁ [for each occurrence] is a photolabile protecting group [, independently,] selected from the group consisting of:



36. (New) A compound represented by the formula M-Y, wherein:

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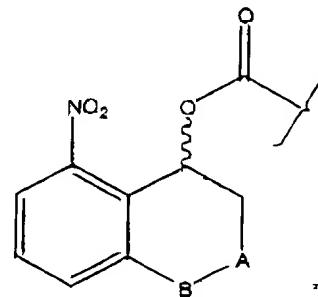
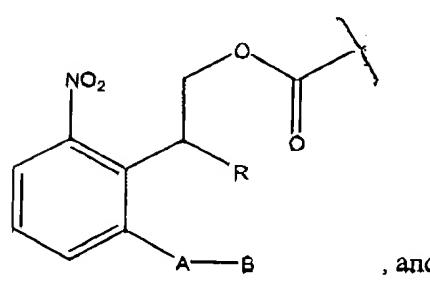
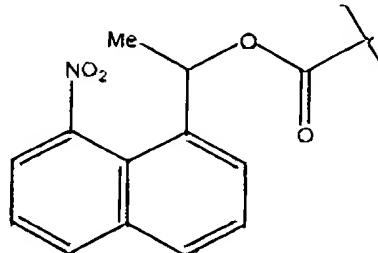
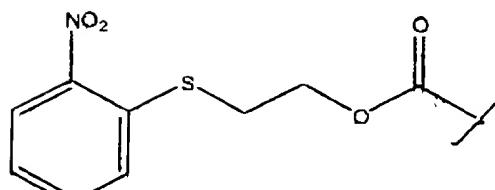
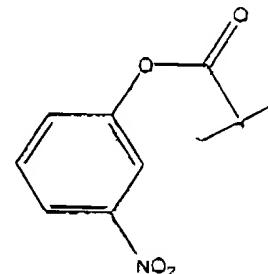
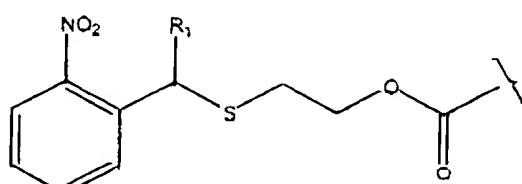
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M is selected from the group consisting of nucleic acids, nucleosides and analogs thereof, nucleotides and analogs thereof, and monosaccharides, all having a reactive site that is masked by Y; and

Y is a photolabile protecting group selected from the group consisting of:



wherein:

the aromatic ring is optionally substituted with an alkoxy group or a methylenedioxy group;

A is O, S, N-alkyl, N-aryl or $(\text{CH}_2)_n$.

n is 1 to about 3.

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B is an aprotic, weakly basic group; and

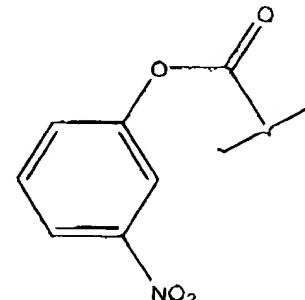
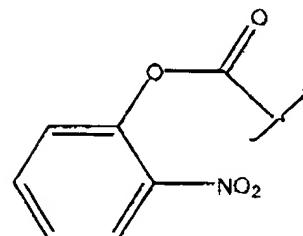
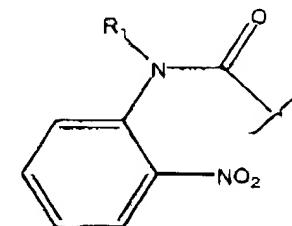
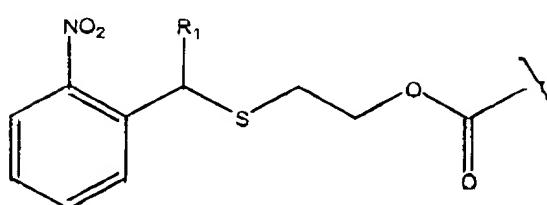
R and R₁ are each, independently, -H, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl group, an optionally substituted aryl group, or an optionally substituted heteroaromatic group.

37. (New) A method of attaching a molecule with a reactive site to a support comprising the steps of:

- (a) providing a support with a reactive site;
- (b) binding a first molecule represented by the formula M₁-Y₁ to the reactive site, wherein:

M₁ is a monomeric building block selected from the group consisting of nucleic acids, nucleosides and analogs thereof, nucleotides and analogs thereof, and monosaccharides, all having a reactive site that is masked by Y₁; and

Y₁ is a photolabile protecting group selected from the group consisting of:

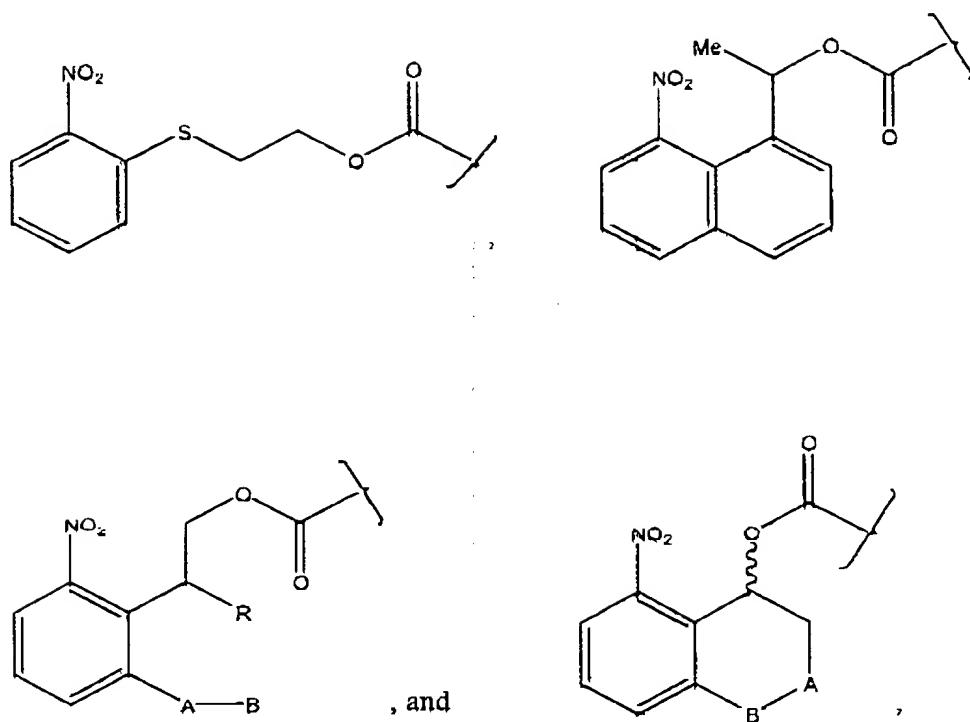


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wherein:

the aromatic ring is optionally substituted with an alkoxy group or a methylenedioxy group;

A is O, S, N-alkyl, N-aryl or $(CH_2)_n$;

n is 1 to about 3;

B is an aprotic, weakly basic group; and

R and R_1 are each, independently, -H, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl group, an optionally substituted aryl group, or an optionally substituted heteroaromatic group; and

(c) removing Y_1 to provide a derivatized support comprising M_1 with an unmasked reactive site immobilized thereon.

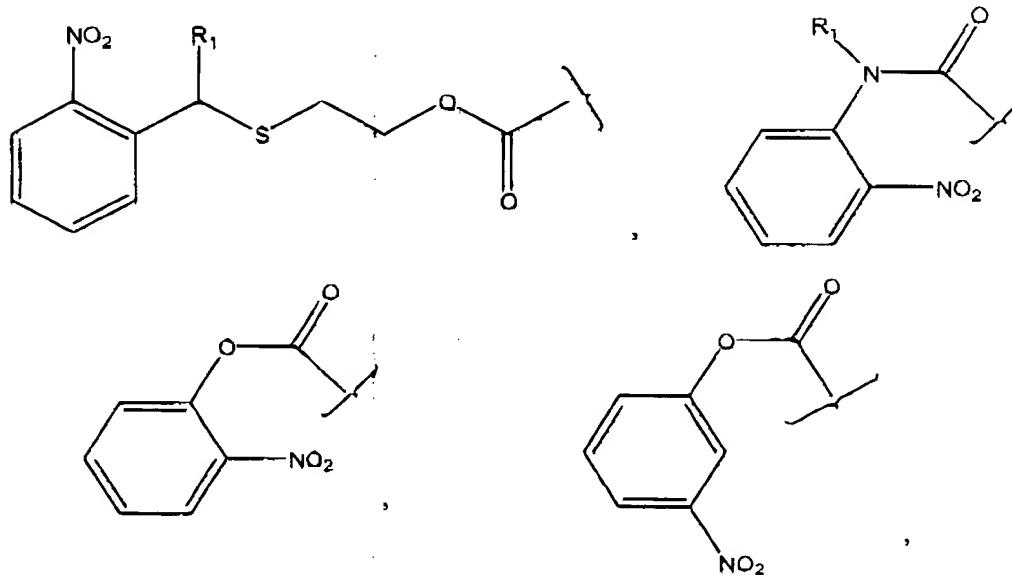
38. (New) A method of forming, from component molecules represented by the formula M_1-Y_1 , a plurality of compounds bound to a support, each compound occupying a separate predefined region of the support, said method comprising the steps of:

(a) activating a first region of the support;

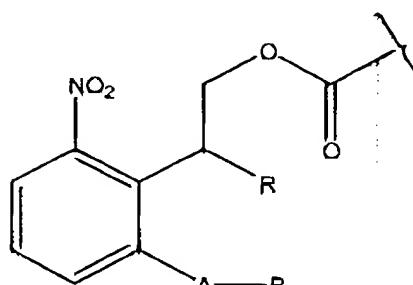
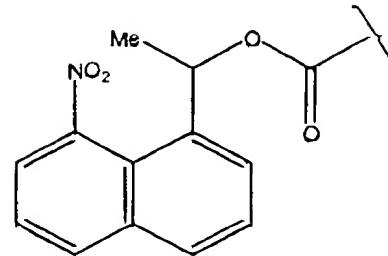
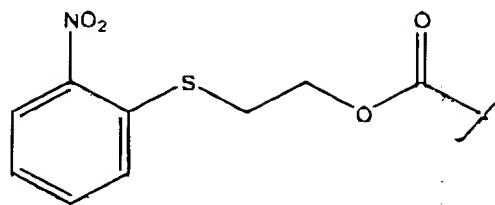
- (b) binding a molecule represented by the formula M_1-Y_1 to the first region;
- (c) repeating steps (a) and (b) on other regions of the support whereby each of said other regions has bound thereto a molecule represented by the formula M_1-Y_1 , wherein M_1 is the same as or different from M_1 of step (b) and Y_1 is the same as or different from Y_1 of step (b);
- (d) removing Y_1 from the M_1 that is bound to one or more regions of the support to provide one or more regions having an unmasked reactive site;
- (e) binding an additional molecule represented by the formula M_1-Y_1 to the said one or more unmasked reactive sites, wherein M_1 is the same as or different from M_1 of steps (b) and (c) and Y_1 is the same as or different from Y_1 of steps (b) and (c); and
- (f) repeating steps (d) and (e) on regions of the support until a desired plurality of compounds is formed from the component molecules represented by formula M_1-Y_1 , each compound occupying separate predefined regions of the support;

wherein:

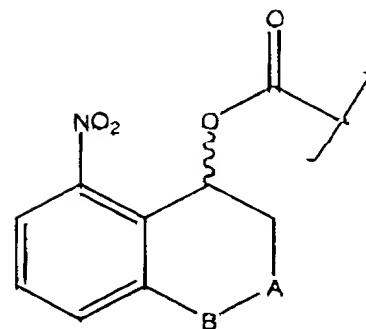
M_1 is a monomeric building block selected from the group consisting of nucleic acids, nucleosides and analogs thereof, nucleotides and analogs thereof, and monosaccharides, all having a reactive site that is masked by Y_1 ; and
 Y_1 is a photolabile protecting group selected from the group consisting of:



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, and



wherein:

the aromatic ring is optionally substituted with an alkoxy group or a methylenedioxy group;

A is O, S, N-alkyl, N-aryl or $(CH_2)_n$;

n is 1 to about 3;

B is an aprotic, weakly basic group; and

R and R₁ are each, independently, -H, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted alkynyl group, an optionally substituted aryl group, or an optionally substituted heteroaromatic group.